

DEPARTMENT OF 193
ENVIRONMENTAL QUALITY
Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE LOCATION: 2209 PHOENIX AVE.
HELENA, MONTANA

MAILING ADDRESS: PO BOX 200901
HELENA, MT 59620-0901

July 28, 1995

Kim Milburn
Director of Public Works
City of Helena
316 North Park Avenue
Helena, MT 59623

Dear Mr. Milburn:

I have been asked to reply to two portions of your June 22, 1995 letter to Mr. James Wilbur of the Solid Waste Program, specifically, Groundwater Monitoring Requirements and Landfill Gas Monitoring.

Groundwater Monitoring Requirements - Landowner Notification.

The requirements of ARM 16.14.708(4)(a)(iii) state:

(iii) Must notify all persons who own the land or reside on the land that directly overlies any part of the plume of contamination if contaminants have migrated off-site if indicated by sampling of wells; (Emphasis added.)

The Program considers the rule's provisions that "all persons" owning or residing on land over "any part" of the plume, to be key considerations in compliance with this regulation. Even though some residents may not have wells of their own, neighbors to the well owners may also be affected by the irrigator's actions. Although ingestion of contaminated water is a serious concern, other forms of contact must also be considered. Things such as inhalation of airborne emissions of VOCs from watering spray or dermal contact to children running through sprinklers are additional concerns. And outside of actual health effects, residents also consider property value impact to be a consideration. The more informed public participation in the remedy selection, the more the final remedy can address the needs and concerns of the residents.

A public notice placed in a newspaper may not be sufficient to notify "all persons" unless it could be demonstrated that "all persons" receive that newspaper. A mailing method, such as inclusion of a notice in a water bill to the affected persons for example, would have sufficient documentation to demonstrate compliance with this requirement. In addition, the requirements of ARM 16.14.707(4) requires that copies of the notification be placed in the operating record and supplied to the Department. A copy of

LANDFILL ROUTE SLIP

7/14/95

☐ NEW APPLICATION

Jim W.
Jon D.
Michelle (proof)
Cathy
Roger

Initial / Date

☐ NEW LICENSE

Jim W.
Jon D.
Michelle (proof)
Carol
Cathy
Roger

Initial / Date

☐ HEALTH OFFICER CARD

Jim W.
Carol
Cathy
Michelle

Initial / Date

☐ INSPECTIONS

Pat C.
Jon D.
Michelle (proof)
Carol
Roger

Initial / Date

☐ INTERIM CLOSURES

Jim W.
Jon D.
Michelle (proof)
Carol
Cathy
Roger

Initial / Date

☐ CLOSURES

Jim W.
Jon D.
Michelle (proof)
Carol
Cathy
Roger

Initial / Date

☐ CHANGE IN LICENSE FOR FEE STATUS

Jim W.
Jon D.
Michelle (proof)
Cathy
Roger

Initial / Date

☒ COMPLAINTS

Pat C. Jim W.
Jon D.
Michelle (proof)
Roger
Carol (filing & DBase)

Initial / Date

SW 7/14
JD 7/17
MKW 7/18 + 7-27
RCS

☒ GENERAL CORRESPONDENCE

Pat C./Jim W.
Jon D.
Michelle (proof)
Roger

Initial / Date

☐ MISCELLANEOUS

Initial / Date

See: Ground Water
Methane
Inspections

Kim Milburn
Page 2
July 28, 1995

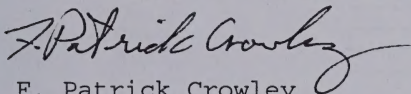
the mailing list and the letter or notice sent to "all persons" would suffice to meet this requirement.

Landfill Gas Corrective Measures

In your letter and in your previous communications you mention that the City has taken several steps due to the high readings in the methane probes near the YMCA, including additional monitoring. The Program does not believe that this action is sufficient to meet the requirements of the regulation that requires the gas to be controlled at the facility boundary and we also believe that further corrective measures are necessary. However, we do need to document in our records what actually has been done to date to remedy the potential safety concerns. To that extent we would like to receive written confirmation of the actual equipment and/or systems installed, and the operation and maintenance plans for the systems and additional monitoring. Please submit this information for our files.

If you have any further questions on these matters, please feel free to contact either myself or Mr. Wilbur at the address and telephone number printed on the letterhead.

Sincerely,



F. Patrick Crowley
Solid Waste Regulatory Lead

cc: Debbie Patch, Director, YMCA, 1200 North Last Chance Gulch, Helena, MT 59601
Steven K. Downs, P.E., Senior Engineer, Hydrometrics, Inc., 2727 Airport Road, Helena, MT 59601
Fritz Zettle, Fire Department, City of Helena, 316 N. Park, Helena, MT 59623
Bill Verwolf, City Manager, City of Helena, 316 North Park Ave., Helena, MT 59623
Ray McKenna, Mayor, City of Helena
Adel Johnson, Montana Air Quality Division, 836 Front Street, Helena, MT
Francis Rowe, Washington Corporation, P.O. Box 8779, Missoula, MT 59807
Katherine Orr, Legal Counsel, DEQ, Helena, MT
Russ Ritter, Inland Properties, PO Box 5476, Helena, MT 59604

File: Helena methane
Path: H:\cb5403\wp\landfill\methane\helena\july1995

LANDFILL F E SLIP

☐ NEW APPLICATION

Initial / Date

Jim W.

Jon D.

Michelle (proof)

Cathy

Roger

☐ NEW LICENSE

Initial / Date

Jim W.

Jon D.

Michelle (proof)

Carol

Cathy

Roger

☐ HEALTH OFFICER CARD

Initial / Date

Jim W.

Carol

Cathy

Michelle

☐ INSPECTIONS

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☐ COMPLAINTS

Initial / Date

Pat C.

Jon D.

Michelle (proof)

Roger

Carol (filing & DBase)

☐ GENERAL CORRESPONDENCE

Initial / Date

Pat C./Jim W.

Jon D.

Michelle (proof)

Roger

☐ MISCELLANEOUS

Initial / Date

proof

Jim W./ Pat C.

Jon D.

Roger T

Y/W 6-19

SW 6-19 / PPC 6-19

SD 6-19

AS 6-30

6/29/95

2nd time

PPC

PPC

PPC

PPC

PPC

SW/L & C hel. rcm

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1902



STATE OF MONTANA

OFFICE 2209 PHOENIX AVE.
LOCATION: HELENA, MONTANA

MAILING PO BOX 200901
ADDRESS: HELENA, MT 59620-0901

June 30, 1995

Ted Hill
City of Helena
316 North Park
Helena, Montana 59623

RE: CITY OF HELENA CLASS II LANDFILL - LICENSE NO. 90
CORRECTIVE MEASURES SELECTION

Dear Mr. Hill:

The City of Helena's responses to the Department's comments and questions on the original Corrective Measures Study that were originally submitted on February 3, 1995, were received on May 9, 1995. In reviewing these responses, the Department believes that they did not address the importance, nor the regulatory requirements, associated with the control of ground water contaminant plume(s) at the waste management unit boundary and/or the relevant point of compliance (RPOC).

- * Monitoring well HL90-1, located north of the facility, has detected concentrations of tetrachloroethene ranging from 10 to 20 ppb over 1.5 years of semi-annual sampling. In the December 1994 event, tetrachloroethene was reported at 15 ppb in HL90-1. The ground water protection standard (GWPS)/maximum contaminant level (MCL) for tetrachloroethene is 5 ppb.
- ** It should also be noted that the east property boundary and the waste management unit boundary are relatively contiguous and represent the RPOC. Monitoring well EPA-1, located at the east-northeast corner of the landfill, has detected volatile organic compounds (VOCs) in excess of the GWPS/MCL for tetrachloroethene. Concentrations of tetrachloroethene in EPA-1 have ranged from the lowest concentration of 33 ppb in April 1994, to the highest concentration of 94 ppb in November 1992. This range is from analytical data over a sampling period from April 1991 to April 1994. Tentatively, concentrations have appeared to stabilize during the last two sampling events (quarterly) at 41 ppb. The GWPS/MCL is 5 ppb for tetrachloroethene, as mentioned above. Please note that no other up gradient or lateral source for the contamination detected in EPA-1 has been demonstrated by the City of Helena, although two additional monitoring wells were installed (i.e.,

DEPARTMENT OF ENVIRONMENTAL SCIENCES

Office of the Secretary
100 North Main Street
Indianapolis, Indiana 46204-2020

DATE: 10/1/88

RECEIVED: 10/1/88
OFFICE OF THE SECRETARY

INDIANA

OFFICE OF THE SECRETARY - INDIANAPOLIS, INDIANA

The following information was received from the Department of Environmental Sciences, Office of the Secretary, regarding the proposed construction of a new building at the site of the former State Capitol building in Indianapolis, Indiana. The proposed building is to be constructed on the site of the former State Capitol building, which was destroyed by fire in 1963. The proposed building is to be constructed on the site of the former State Capitol building, which was destroyed by fire in 1963. The proposed building is to be constructed on the site of the former State Capitol building, which was destroyed by fire in 1963.

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City of Helena Class II Landfill

Page 2

June 30, 1995

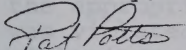
94-1 and 94-3). Neither of these two wells have detected any VOCs to date.

In the introductory portion of the rule [ARM 16.14.708(7)(e)], it states that the Department will determine, through a demonstration provided by the owner/operator of the landfill, whether or not remediation of a release is necessary. The City's brief explanation for a No Action alternative, as provided in the response letter, does not appear to adequately demonstrate that there is no hydraulic connection between the contaminated ground water from the landfill and the Helena Valley aquifer.

The Department would like to refer the City to the USGS Water Resources Investigation Report 92-4023 entitled "Hydrogeology of the Helena Valley-Fill Aquifer System, West-Central Montana", April 1992. This document delineates the extent of the Helena Valley-Fill Aquifer which includes the area from Last Chance Gulch and the intervening landfill property as a part of the recharge area for the valley aquifer system.

Active measures may need to be proposed and implemented to reduce chemical constituent concentrations to GWPSs or less, at the RPOC. However, the study/plan should be presented in a public meeting [ARM 16.14.708(6)(d)] as soon as possible. It is important to discuss the required passive source control measures that the City initially proposed, but please note that these measures are already required according to the rules for an approved landfill closure.

Sincerely,



Pat Potts

Environmental Specialist

cc: Steve Downs, Hydrometrics, Inc., 2727 Airport Road, Helena, MT 59601

Kim Milburn, City of Helena, 316 North Park Avenue, Helena, MT 59623

Bill Verwolf, City of Helena Manager, 316 N. Park Ave.,
Helena, MT 59623

Vivian Drake, City-County Building, 316 North Park Ave., P.O. Box 1723,
Helena, MT 59624

Russ Ritter, Inland Properties, P.O. Box 5476, Helena, MT 59604

path: sw\l&chel.rcm

file: Lewis and Clark Co./City of Helena Class II (inactive)/grd wtr (corr)

10-1 and 10-2. Neither of these two wells have been dug and
WOM to date.

In the introductory portion of the report (p. 10-1) it is
stated that the Department will determine through a geological
survey by the Department of the Interior, whether or not
revelation of a relation is necessary. The City's first obligation
for a No Action alternative, as provided in the response letter,
does not appear to adequately demonstrate that there is no hydraulic
connection between the contaminated ground water from the landfill
and the Walnut Valley aquifer.

The Department would like to refer the City to the USGS Water
Resources Investigation Report 10-1001 entitled "Hydrogeology of the
Walnut Valley-Fall Region, West-Central Montana". April
1954. This document delineates the extent of the Walnut Valley-Fall
aquifer which is shown on the map from West-Central Montana and the
underlying landfill region as a part of the recharge area for the
Walnut Valley aquifer.

Active measures may need to be proposed and implemented to reduce
potential contamination of the Walnut Valley aquifer from the landfill.
However, the City should be prepared in a public meeting (p. 10-1001) to show as possible. It is important to discuss
the proposed passive control measures that the City initially
proposed, but please note that these measures are already required
according to the rules for an approved landfill closure.

Respectfully,
[Signature]
[Name]
[Title]
Environmental Specialist

Enclosed for the City of Helena are two copies of the report
entitled "Hydrogeology of the Walnut Valley-Fall Region, West-Central
Montana". The report is dated April 1954. The report is
available for review at the Department of the Interior, U.S. Bureau of
Reclamation, Helena, Montana. The report is also available for review
at the Department of the Interior, U.S. Bureau of Reclamation, Helena,
Montana. The report is also available for review at the Department of the
Interior, U.S. Bureau of Reclamation, Helena, Montana.

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1499

STATE OF MONTANA

OFFICE 2209 PHOENIX AVE.
LOCATION: HELENA, MONTANA

MAILING PO BOX 200901
ADDRESS: HELENA, MT 59620-0901



May 22, 1995

CERTIFIED MAIL: Return Receipt Requested

Kim C. Milburn, P.E.
Public Works Director
City of Helena
316 N. Park Avenue
Helena, MT 59623

SUBJECT: City of Helena Class II Landfill, License Number 90,
Inspection Report & Notice of Violation

Dear Mr. Milburn:

On April 29, 1995, Lara Dando and I inspected the subject facility for compliance with the rules and regulations governing solid waste disposal in Montana. Enclosed you will find a copy of the on-site observation report and the official Inspection Report (Notice of Violation).

The Inspection Report has been separated into various sections, such as General Operation and Maintenance Plan and Ground Water Monitoring Requirements. Each section has then been further divided into "Major Violations", "Minor Violations", and "Comments". Under the appropriate category, I have quoted the rule or regulation which was violated and an explanation of the specific problem. Major violations need immediate correction. If left uncorrected, these problems may result in further action by the Department of Health and Environmental Sciences. Minor violations need prompt attention to prevent them from becoming a major problem. These violations need to be corrected in order to bring your operation into compliance. Since there are numerous violations and several involve compliance issues related to communication with the Department, the City of Helena (owner/operator) is required to respond within thirty (30) days of receipt of this letter in writing to the Solid Waste Management Program. The response to this Inspection Report should either document compliance relative to the listed violations and/or provide a compliance schedule to bring this facility into compliance with the listed requirements.

We want to help you get your landfill into compliance, and will try to provide any assistance you may need to do so. Thank you for your

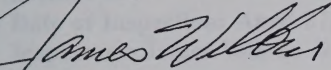
City of Helena Landfill Inspection

Page 2

May 22, 1995

cooperation in this matter and please do not hesitate to contact this office if you have any questions or comments.

Sincerely,



James Wilbur
Solid Waste Program

Enclosures: Official Inspection Report, Copy of On-Site Observation Form

cc with copy of Official Inspection Report:

Ted Hill, City of Helena
Bill Verwolf, City Manager, City of Helena
Joan Miles, Lewis & Clark County Health Officer
Willie Miller, Transfer Station Manager, City of Helena (include copy of NESHAP Landfill Recordkeeping Inspections)
Steve Downs, Hydrometrics, Inc., 2727 Airport Road, Helena, MT 59601
Francis Rowe, Washington Corporation, P.O. Box 8779, Missoula, MT 59807
Occupational & Radiological Health Bureau, AQD, DHES

SOLID WASTE MANAGEMENT SITE/SYSTEM OFFICIAL INSPECTION REPORT

(Notice of Violation, ARM 16.14.526(1))

ARM = Administrative Rules of Montana

Department = Montana Department of Health and Environmental Sciences

MSWLF = Municipal solid waste landfill

NESHAP = National Emissions Standards for Hazardous Air Pollutants

CFR = Code of Federal Regulations

MCA = Montana Code Annotated

MSWMA = Montana Solid Waste Management Act

Facility: City of Helena Class II Landfill

Owners: City of Helena & Washington Corp.

Operator: City of Helena

License #90

Date of Inspection: April 27, 1995

Inspectors: James Wilbur & Lara Dando

Ground Water Monitoring Requirements

Major Violation:

ARM 16.14.708

(4) If one or more Table 2 (ARM 16.14.706) constituents are detected at statistically significant levels above the ground water protection standard established under (5) of this rule in any sampling event, the owner or operator must, within 14 days of this finding, place a notice in the operating record identifying the Table 2 constituents that have exceeded the ground water protection standard and notify the department and all appropriate local government officials. The owner or operator also:

(a)(iii) Must notify all persons who own the land or reside on the land that directly overlies any part of the plume of contamination if contaminants have migrated off-site if indicated by sampling of wells;

Discussion: According to our files the Department informed the City of this requirement for public notification of contamination in letters sent July 28, 1994 and November 16, 1994. It has come to our attention that not all persons described in the rule have been notified to date. Program personnel have been informed in phone conversations that the City has notified well owners in the affected area. However, the rule specifies all persons who own the land or reside on the land that directly overlies any part of the plume of contamination must be notified to comply with the regulation.

Landfill Gas Monitoring

Major Violations:

ARM 16.14.521(1)(g) Owners or operators of all Class II landfill units must implement a department approved routine methane monitoring program that ensures that the standards of (f) of this subsection are met and that meets the following requirements:

(i) The type and frequency of monitoring must be determined based on the following factors:

- (A) Soil conditions;
 - (B) The hydrogeologic conditions surrounding the facility;
 - (C) The hydraulic conditions surrounding the facility; and
 - (D) The location of facility structures and property boundaries.
- (ii) The minimum frequency of monitoring must be quarterly.

Discussion: The Department approved the City's proposed methane monitoring system for this landfill in October, 1993. However, three monitoring probes to be installed on the northern boundary of the site adjacent to the railway tracks have never been installed and no gas monitoring has been conducted in that area. Program personnel have discussed this issue with City staff several times, but no action or City request for temporary monitoring plans have occurred.

The City increased the monitoring frequency to monthly in a letter of November 15, 1994 to Lara Dando of this Department. No test results have been received since January 25, 1995. The January, 1995 report did not indicate monitoring results of the MPC office basement or the Elk Creek Concrete Shop, both of which are included in the City's approved monitoring site list. Also, in the past the Department has recommended that the City consider adding the Memorial Park Swimming Pool building to its monitoring sites.

ARM 16.14.521(1)(h) If methane gas levels exceeding the limits specified in (f) of this subsection are detected, the owner or operator must:

(i) Immediately take all necessary steps to ensure protection of human health and notify the state director;

(ii) Within seven days of detection, place in the operating record and notify the department in writing of the methane gas levels detected and a description of the steps taken to protect human health; and

(iii) Within 60 days of detection, implement a department approved remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify the department that the plan has been implemented. The plan shall describe the nature and extent of the problem and the proposed remedy.

Discussion: The Department has not received a remediation plan from the City to deal with the landfill gas exceedances detected at the landfill (initially on September 15, 1994) under the monitoring program implemented under ARM 16.14.521(1)(f).

Special Waste Handling

Comments:

40 CFR 61.151(e) (NESHAP) Upon closure of a facility, the owner or operator of the site must submit to the Administrator a copy of the records of the location, depth, and area, and quantity (yd³ or m³) of asbestos containing waste material (ACWM) within the disposal site which have been maintained on a map or diagram of the disposal area.

In addition, within 60 days of closing a waste disposal site, the owner/operator must record a notation on the deed to the facility property, and on any other instrument that would normally be examined during a title search, that:

- The land was used for the disposal of ACWM,
- The survey plot and record of the location and quantity of ACWM disposed of within the disposal site have been filed with the Administrator, and
- The site is subject to the National Emission Standards for Hazardous Air Pollutants: Asbestos (40 CFR part 61 subpart M).

Discussion: Notification of closure of this facility to Occupational & Radiological Health Bureau of the Department is required under NESHAP rules. A deed notification is also required under ARM 16.14.530.

Examination of Operation Records

Major Violation:

ARM 16.14.521(1)(p) The owner or operator of a Class II disposal unit must record and retain at the facility or at an alternative location approved by the department, an operating record containing the following information as it becomes available:

- (i) Any location restriction demonstration required under this subchapter;
- (ii) Inspection records, training procedures, and notification procedures required under this subchapter;
- (iii) Gas monitoring results from monitoring and any remediation plans required by this subchapter;
- (iv) Any design documentation for construction or the placement of leachate or gas condensate in a landfill unit as required under this subchapter;
- (v) Any demonstration, certification, finding, monitoring, testing, or analytical data required by department ground water monitoring regulations found in ARM 16.14.701 et seq.;

(vi) Closure and post-closure care plans and any monitoring, testing, or analytical data required by this subchapter;

(vii) Any cost estimates and financial assurance documentation required by this subchapter;

(viii) Any information demonstrating compliance with and approval of the small community exemption; and

(ix) Any waste quantity records required under this subchapter.

ARM 16.14.707(4) A copy of all plans, reports, studies and other ground water monitoring methods or activities must be supplied to the department and placed in the operating record.

Discussion: The location of the operating record was not at the landfill or transfer station offices. We were directed to the wastewater treatment plant office where some records were kept (i.e. gas monitoring results and miscellaneous reports). However, these records were not complete and the complete operating record for this facility was unavailable during this inspection. The City has not notified the Department of an alternative location for the operating record for this facility. Therefore, no approval for an alternative location has been given at this time.

Landfill Closure Requirements

Major Violations:

ARM 16.14.530(1) Closure criteria for Class II landfills are as follows:

(a) Owners or operators of all Class II landfill units must install a final cover system that is designed to minimize infiltration and erosion. The final cover system must be designed and constructed to:

(i) Minimize infiltration through the closed unit by the use of an infiltration layer that contains a minimum 18 inches of earthen material and have a permeability less than or equal to the permeability of any bottom liner, barrier layer, or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less;

Discussion: This facility has an approved closure plan which includes an appropriate barrier layer as a final cover component. The majority of the barrier layer was constructed in 1994 (lack of compaction of side slopes were the uncompleted areas); however, the City planted trees and installed a drip irrigation layer within this barrier layer above the waste disposal areas adjacent to the transfer station. When this breach of the barrier layer was discovered by Program staff the City was informed of the need to remove and/or demonstrate that these activities did not compromise the required barrier layer. The City has yet to resolve this matter with the Department. It was noted during the inspection that the easternmost line of trees had been

removed, but not all trees on the old landfill, and it is unknown if the irrigation line had been removed.

ARM 16.14.530(1) Closure criteria for Class II landfills are as follows:

(a) Owners or operators of all Class II landfill units must install a final cover system that is designed to minimize infiltration and erosion. The final cover system must be designed and constructed to:

(ii) Minimize erosion of the final cover by the use of a seed bed layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth and protecting the infiltration layer from frost effects and rooting damage; and

Discussion: The failure of the City to complete the final cover of the landfill area last summer or fall by construction of the seed bed layer component raises the question of whether the barrier layer has been damaged during the winter. Also, erosional rills and initial formation of gullies on the surface of the barrier layer were noted during the inspection. Ponding of surface water was noted by the transfer station entrance road adjacent to the southern railroad tracks.

ARM 16.14.530(1)(g) The owner or operator of all Class II landfill units must complete closure activities of each Class II unit in accordance with the closure plan within 180 days following the beginning of closure as specified in (1)(f) of this rule. Extensions of the closure period may be granted by the department if the owner or operator demonstrates that closure will, of necessity, take longer than 180 days and he has taken and will continue to take all steps to prevent threats to human health and the environment from the unclosed Class II landfill unit.

Discussion: The City initiated closure as required by ARM 16.14.530(1)(h) as cited above, but failed to complete construction of the final cover in the required 180-day time frame (last receipt of wastes March or April of 1994). No extension was requested or granted for completion of closure work at this site. As mentioned above the delay of completion may have damaged the already constructed components of the final cover at this site.

Comments:

ARM 16.14.530(1)(h) Following closure of each Class II landfill unit, the owner or operator must notify the department that closure has been completed in accordance with the closure plan. A certification, signed by an independent registered professional engineer, or the department, verifying that closure has been completed in accordance with the closure plan, must be placed in the operating record.

ARM 16.14.530(1)(i) Following closure of all Class II landfill units, the owner or operator must record a notation on the deed to the landfill facility property, or some other instrument that is normally examined during title search, and notify the department that the notification has been recorded and a copy has been placed in the operating record.

Discussion: These requirements and those in the following section are cited to inform the City of their ongoing responsibilities for the closure and post-closure care of this site. Also, refer to the deed notification requirement for NESHAP under Special Waste Handling comments.

Post Closure Care Requirements

Comment:

16.14.531(1) Post closure care for Class II landfills:

(a) Following closure of each Class II landfill unit, the owner or operator must conduct post-closure care. Post-closure care must be conducted for 30 years, except as provided under (b) of this subsection, and consist of at least the following:

(i) Maintaining the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover;

(ii) Maintaining and operating the leachate collection system in accordance with the requirements in ARM 16.14.506. The department may allow the owner or operator to stop managing leachate if the owner or operator demonstrates that leachate no longer poses a threat to human health and the environment;

(iii) Monitoring the ground water in accordance with the requirements of ARM Title 16, chapter 14, subchapter 7, and maintaining the ground water monitoring system, if applicable; and

(iv) Maintaining and operating the gas monitoring system in accordance with the requirements of ARM 16.14.521.

(b) The length of the post-closure care period may be:

(i) decreased by the department if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment and this demonstration is approved by the department; or

(ii) increased by the department if the department determines that the lengthened period is necessary to protect human health and the environment.

(c) The owner or operator of all Class II landfill units must prepare a written post-closure plan that includes, at a minimum, the following information:

(i) A description of the monitoring and maintenance activities required in ARM 16.14.531(1)(a) for each Class II landfill unit, and the frequency at which these activities will be performed;

(ii) Name, address, and telephone number of the person or office to contact about the facility during the post-closure period; and

(iii) A description of the planned uses of the property during the post-closure period. Post-closure use of the property must not disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements in these rules. The department may approve any other disturbance if the owner or operator demonstrates that disturbance of the final cover, liner or other component of the containment system, including any removal of waste, will not increase the potential threat to human health or the environment.

(d) The owner or operator must submit to the department a post-closure plan for approval and place a copy of that plan in the operating record no later than October 9, 1993, or by the initial receipt of waste, whichever is later.

(e) Following completion of the post-closure care period for each Class II landfill unit, the owner or operator must submit to the department a certification, signed by an independent registered professional engineer for approval by the department, verifying that post-closure care has been completed in accordance with the post-closure plan. A copy of the approved document must be placed in the operating record.

Discussion: As stated in previous discussion, rule is provided for your information.

ROUTE SLIP

DEPARTMENT OF HEALTH & ENVIRONMENTAL SCIENCES

TO: Roof cu DATE: 3/21/95
 1. Jim W Pat C
 2. Roger T Jon A
 3.

- | | | |
|--|---|---|
| ☒ Approval | ☐ Comment | ☐ Necessary Action |
| ☐ Note and Return | ☐ Note and File | ☐ Investigate |
| ☐ Prepare reply | ☐ Signature | ☐ See Me |
| ☐ As requested | ☐ For your information | ☐ Per Conversation |

REMARKS:

sw / 1 + chel. cms

FROM: 3

DEPARTMENT OF ENVIRONMENTAL SCIENCES

ment Division
 te Program
 44-1430

FAX # (406) 444-1499

MONTANA

MAILING PO BOX 200901
 ADDRESS: HELENA, MT 59620-0901

WILL - LICENSE NO. 90
RECTIVE MEASURES ASSESSMENT FOR
HELENA, MONTANA

ES ASSESSMENT FOR THE CITY OF
epartment by Hydrometrics on
e of concern is the final
e by the City. The selected
ument is termed "Existing

Corrective Measures". This particular remedy(ies) selection may be viewed as interim abatement measures, or merely the application of already required regulatory and institutional controls. Specifically, "Existing Corrective Measures", according to this study includes the following items:

- * Ground Water Monitoring, as required according to ARM 16.14.701(2)(b) and ARM 16.14.712(1);
- * Institutional Controls, according to an existing city ordinance requiring each residence within the city limits to connect to the city water supply for potable use, and a ban on additional wells within the city limits; and
- * Existing Corrective Measures, which were identified as landfill closure, clay cap, and storm drain extension.

[Note that the landfill has not received final closure approval by the State due to the lack of re-vegetation efforts and the application of an infiltration layer, as required over the capping material.]

As for a direct, active approach toward the attainment of ground water protection standards/enforcement standards and source control which would reduce or eliminate further releases and or decrease the areal extent of the plume(s), the selected alternative of "Existing Corrective Measures" is essentially equivalent to a No Action

alternative. This alternative selection does not appear to be sufficiently protective of human health and the environment.

Possible avenues of risk and/or exposure that have not been considered in this alternative selection are:

Residences with impacted wells outside of the city limits that use their well water as a source of drinking water. Although no one contaminant exceeds a particular standard at this time, what might be the cumulative effect of these VOCs (even if they are not all attributable to the landfill) in their drinking water? Especially consider the portions of the population at higher risks, such as children and the elderly. Some of the residences that have been sampled that could be at risk are:

Robinson @ 328 Custer (#47),

C.A. Barbeau @ 308 Custer (#48),

W. Hill @ 112 Meadow (#42),

E. Hartze @ 220 Custer (#51),

No Name @ Custer and Green Meadow (#52),

Bacon @ 108 Dunbar (#57),

Stolp @ 100 and 102 Dunbar (#59),

J. Bridges @ 76 Dunbar (#62), and

Elk River Concrete's well along Benton Avenue should have a warning sign.

Additional reinforcement discouraging the usage of irrigation wells and industrial supply wells for domestic usage/drinking within the city limits should also be considered.

In general, the screening process as a whole, addressed the issues required according to ARM 16.14.708. However, it is important to point-out that the initial screening criteria are to be reviewed according to ARM 16.14.708(6)(c) which is intended to address the following points for each potential remedy:

(i) The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;

- (ii) The time required to begin and complete the remedy;
- (iii) The costs of remedy implementation; and
- (iv) The institutional requirements such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(ies).

Alternatives selected through the initial screening process are to be screened according to ARM 16.14.708(7)(c) which provides the following information for each alternative selected:

- (i) The long and short-term effectiveness and protectiveness of the potential remedy(ies), along with the degree of certainty that the remedy will prove successful . . .;
- (ii) The effectiveness of the remedy in controlling the source to reduce further releases . . .;
- (iii) The ease or difficulty of implementing a potential remedy(ies) . . .;
- (iv) Practicable capability of the owner or operator, including a consideration of the technical and economic capability.
- (v) The degree to which the community concerns are addressed by a potential remedy(ies).

The final selection of an appropriate remedial alternative is to be evaluated according to the following factors ARM 16.14.708(7)(b):

- (i) Be protective of human health and the environment;
- (ii) Attain the ground water protection standards as specified pursuant to (5) of this rule (i.e., ARM 16.14.708);
- (iii) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of Table 2 [ARM 16.14.706] constituents into the environment that may pose a threat to human health or the environment;

City of Helena Class II Landfill

Page 4

April 4, 1995

(iv) Comply with standards for management of wastes as specified in (8) of this rule.

(v) Be approved by the Department.

Although the specific regulatory format was not strictly followed, the pertinent technical information was presented in a clear, concise manner in this document. The final remedy(ies) selected, at a minimum, should be reviewed for the criteria required according to ARM 16.14.708(7)(b). In addition, the Department suggests the following items be reviewed for accuracy and revised, or clarified, as necessary:

1. TABLE 2-1

Why aren't 83-7 and EPA-2 being sampled? Are they plugged and abandoned? Was April 1994 the first time EPA-1 was sampled and the ground water analyzed for VOCs?

Are there any monitoring wells or piezometers left west-northwest of EPA-1? If so, could they be sampled?

2. Page 2-3

A. What concentration level(s) were used to calculate the volumetric equivalent of tetrachloroethene dissolved in a 365 acre, 50-foot deep plume?

B. Please list the specific monitoring wells that are completed in the lower part of the aquifer, and the total depth with the length of screened interval for each well. Approximately how thick is the aquifer beneath the landfill?

3. 2.2 GROUND WATER PROTECTION STANDARDS (GWPSs) pg. 2-7

A. Methylene chloride (dichloromethane) does have a human health standard (HHS according to Montana WQB-7) which is 4.7 $\mu\text{g/L}$, and a maximum contaminant level (MCL), State and Federal, which is 5 $\mu\text{g/L}$.

B. What was the calculated GWPS for methylene chloride according to the risk-based equation presented on the bottom of page 2-7? How does it compare with the HHS, and the MCL?

4. Page 2-9

Please note that the following constituents do have State HHSs, as well as State and Federal MCLs:

bromoform	HHS= 0.56 $\mu\text{g/L}$	MCL= 100 $\mu\text{g/L}$
dibromochloromethane (chlorodibromomethane)	HHS= 0.4 $\mu\text{g/L}$	MCL= 100 $\mu\text{g/L}$

5. Page 2-9

If you can demonstrate that ground water contamination is coming from an upgradient source(s) other than the landfill through historical record documentation and/or field investigations, the Department would appreciate the timely submittal of this information, so that it can be reviewed, and so that other potentially responsible polluters or localized sources of contamination can be found and cleaned up.

6. Page 2-10, TABLE 2-2

GWPSs have been established for the following compounds:

bromodichloromethane (chlorodibromomethane)	HHS= 0.41 $\mu\text{g/L}$	MCL= 100 $\mu\text{g/L}$
bromoform	HHS= 0.56 $\mu\text{g/L}$	MCL= 100 $\mu\text{g/L}$
dibromochloromethane (chlorodibromomethane)	HHS= 0.4 $\mu\text{g/L}$	MCL= 100 $\mu\text{g/L}$
methylene chloride (dichloromethane)	HHS= 4.7 $\mu\text{g/L}$	MCL= 5 $\mu\text{g/L}$

These standards need to be included in Table 2-2. Also, see comments in item #4 above (i.e., section 2.2 of the document), as some of this information has been repeated for the purpose of clarity in these comments.

7. Page 2-11

A. Please explain how, and to what particular upgradient source(s) the following constituents are attributable: arsenic, chloroform, selenium, and bromodichloromethane. Bis (2-ethylhexyl) phthalate (check spelling in document, please) is a common laboratory contaminant and has been detected in many of the Table 2 analyses for landfills in Montana.

B. All but one [bis (2-ethylhexyl) phthalate] of the above constituents have an MCL, and therefore, a GWPS/enforcement standard. Please explain how background concentrations are compared to GWPSs/MCLs at this site for the parameters/constituents mentioned above. It is not clear from the text what exactly is intended.

C. To what practical quantitation limit are you referring with regard to sulfides? There is a secondary drinking water standard for sulfate, but no enforcement standard, MCL, or PQL as far as I know; please explain. Also, note that the ARM citation should be corrected in this paragraph to read ARM 16.14.706.

D. Was there a reason for not including tetrachloroethene in the list of constituents entitled "potentially attributable to the landfill"? I realize the next section (i.e., 2.3 Contaminants of Concern) specifically addresses tetrachloroethene, but this chemical compound should appear on the list immediately preceding this section, as well.

8. DEGRADATION IN WATER Page 2-13

Please keep in mind that some of the commonly encountered degradation products of tetrachloroethene, when associated with landfill environments (anaerobic conditions, possible methanogenesis) are 1,2-dichloroethene (cis- and trans-), and/or vinyl chloride.

9. Page 2-15

Please explain the risks, if any, that may be associated with the ingestion of tetrachloroethene which would be associated with home grown produce from backyard gardens irrigated with elevated levels of the VOCs found in the ground water at, and adjacent to the landfill. Also consider possible risks for ground water usage in swimming pools and lawn watering. In some instances, it has been mentioned that well water is being used for drinking for various personal reasons (taste, economics, etc.).

10. Page 2-16 EPA DRINKING WATER HEALTH ADVISORIES

Shouldn't the discussion concerning long-term health advisories be for protection against carcinogenic effects, not non-carcinogenic effects? If so, were the protective levels given in the text supposed to be in mg/L, or $\mu\text{g/L}$, as the MCL is only 5 $\mu\text{g/L}$ for tetrachloroethene?

11. Page 5-7, Figure 5-2 "Landfill Gas Extraction and Treatment"

This figure is inadequate for the determination of any landfill gas extraction plan. Maybe this figure was submitted incomplete by mistake. Please complete this figure to show plans for a landfill gas extraction system if you would like this technical methodology to be considered as a remedial alternative for the clean-up of the ground water contamination, and/or as possible source control.

12. Page 5-10, Figure 5-4

Relatively speaking, where will the soil vapor extraction (SVE) wells and/or horizontal piping be installed relative to the air sparging plan outlined on this figure?

The Department is concerned that this approach to ground water remediation would likely result in explosive methane/air mixtures as described in Section 5.3.3. Please explain in greater detail, the likelihood of such an explosive situation, or the preventative measures that could be taken in advance to avoid this hazardous situation.

13. Page 5-13, Figure 5-6

Maximum tetrachloroethene concentrations (i.e., those exceeding the MCL) in the ground water appear to be localized adjacent to the northwest corner of the landfill property boundary [specifically, HL-90-1 (15 to 20 $\mu\text{g/L}$)]. Both the air sparging (and apparently the SVE, if displayed) and the ground water extraction plans only cover the northern boundary of the landfill, along the railroad tracks, westward to the Elk River Concrete facility. Do you think ground water flow control and/or soil vapor extraction (i.e., behind Elk River Concrete, or just west of the transfer station) would be helpful on the west-northwest landfill facility property boundary?

GENERAL ECONOMIC COMMENTS

The Department strongly suggests that the City have several ground water models prepared to demonstrate the effects of these proposed remediation alternatives. This should include impacts on the contaminants and contaminant concentrations, compared to the length of time required for the ground water clean-up. Physical as well as chemical factors need to be more thoroughly evaluated to determine the applicability of the specific alternative(s).

An example of such a model demonstration for pump and treat would be based on the aquifer data available and the number of extraction wells required to sufficiently depress the water table to efficiently intercept the contaminants. Based on the nature of the contaminants, will the selected alternatives efficiently address all ground water contamination, or will phase-separated products (i.e., DNAPLs at the base of the aquifer) remain behind?

Would SVE be adequate, even with air sparging to address the tetrachloroethene problem in the ground water, or will this technology only deal with the less dense VOCs? Is it possible from the data available to determine if the tetrachloroethene contamination is coming from a DNAPL pool at the base of the aquifer? Detectable concentrations of 1,1,1-trichloroethane appear to be centered around a cluster of private wells located north of

City of Helena Class II Landfill
Page 8
April 4, 1995

Custer Avenue. Does this help to explain possible degradation processes, or age date the contaminant plumes or chemical travel times in the aquifer in any way?

Assuming a landfill gas extraction system is required at this facility anyway due to the exceedance of lower explosive levels of landfill gases in the unsaturated zone, the design plan and schedule for implementation could be included in this CMS.

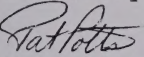
INCOMPLETE ALTERNATIVE

It has come to the Department's attention that no re-vegetation has occurred, nor has the required erosional soil cover been installed over the low permeability/non-infiltration layer. This delay in final landfill closure requirements has created extended renewal fee payments for the City. Please be advised that if these passive, source control requirements are seriously being considered as the selected alternative for ground water remediation at this site, then these final closure requirements must be met in a timely manner, or a reasonable schedule of completion dates will need to be submitted to the Department along with any additional design requirements for prompt consideration.

REQUIRED PUBLIC MEETING

The required public meeting [ARM 16.14.708(6)(d)] will also be necessary to finalize the actual alternative selection. It is the responsibility of the owner/operator to schedule this meeting and provide sufficient public notice. The Department suggests that we have a meeting well in advance of the public meeting to discuss the above issues, and hopefully agree on the most effective and appropriate approach to ground water remediation at this site for all involved parties.

Sincerely,



Pat Potts
Environmental Specialist

cc: Steve Downs, Hydrometrics, Inc., 2727 Airport Road, Helena, MT 59601
Kim Milburn, City of Helena, 316 North Park Avenue, Helena, MT 59623
Bill Verwolf, City of Helena Manager, 316 N. Park Ave.,
Helena, MT 59623
Vivian Drake, City-County Building, 316 North Park Ave., P.O. Box 1723,
Helena, MT 59624

path: sw\l&chel.cms
file: Lewis and Clark Co./City of Helena Class II (inactive)/grd wtr (corr)

**CLOSED
CITY OF HELENA LANDFILL
LICENSE NUMBER 90**

HYDROMETRICS

**EVALUATION OF DECEMBER 1995
GROUNDWATER QUALITY DATA**

APRIL 1996

**IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 3**

RECEIVED 4/3/1996

**CLOSED
CITY OF HELENA LANDFILL
LICENSE NUMBER 90**

HYDROMETRICS

**DECEMBER 1995 GROUNDWATER
SAMPLING DATA**

JANUARY 1996

**IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 3**

RECEIVED 1/23/1996



DEPARTMENT OF
ENVIRONMENTAL QUALITY

*File: Lewis & Clark Co.
City of Helena (II)
gnd wtr (corr)*



FAX # (406) 444-1499

STATE OF MONTANA

OFFICE 2209 PHOENIX AVE.
LOCATION: HELENA, MONTANA
Waste Management Division
Solid waste Program
(406) 444-1430

MAILING PO BOX 200901
ADDRESS: HELENA, MT 59620-0901

MEMORANDUM

TO: City of Helena
FROM: Pat Potts
DATE: November 30, 1995

*Hand presented to
Kim Milburn @ meeting
11/30/95 (10:00 AM).*

SUBJECT: Permission granted from MPC for the City to sample new ground water monitoring wells recently installed at the MPC facility east of the landfill.

Mike Larson, with the environmental division of MPC called me about two weeks ago to inform me that they had installed 4 new monitoring wells in the MPC facility east of the landfill (i.e., across the street). He informed me that MPC would allow the Department and/or the City to sample these wells.

MPC is only analyzing the ground water in this area for PAHs and BTEX, and possibly some metals and cyanide. The wells are between 45 and 60 feet deep. Mike Larson can be contacted in Butte at 723-5454 (ext. 73106) for specific permission, timing, and type of equipment needed to sample these wells.

It is interesting to me that he mentioned the downgradient well is located next to Main Street and the other wells are located in the parking lot around the facility buildings. He talked about the upgradient well being located around the equipment area in the back. It may be helpful to see a copy of his ground water elevation map prior to sampling. Obviously, the Department strongly encourages the City to sample several, if not all four of these new monitoring wells as soon as possible, so that the data might coincide with the Fall 1995 sampling event that has probably recently taken place at the landfill.

Mike said these wells would be developed within the next week after installation. So by now, everything should be ready for an easy purge and sample.

The Department suggests that the City of Helena sample, at least for the complete Table 1 list of VOCs, plus dichlorodifluoromethane. This is a wonderful opportunity for the City to gain some additional water quality information, so close to the waste management unit boundary and the property boundary on the east. This area is precisely where the City has detected elevated levels of tetrachloroethene. The water quality information, as well as the water level elevations from these new MPC wells should be very helpful to the City. It will be very cost efficient as well because this sampling activity will only cost the time to sample the wells plus the laboratory analysis.

MPC has been very generous to allow us the opportunity to sample these new wells. The Department sincerely hopes that the City will be able to work with MPC to accomplish at least one year's (Fall 1995 and Spring 1996) worth of samples from these wells for VOCs.

Please keep the Department notified as to the outcome of the contact with the City and Mike Larson with MPC.

path: sw\l&chel.mem

file: Lewis & Clark Co./City of Helena Landfill (inactive)/grd
wtr

Initials ³ Date 11/1/95

SOLID WASTE PROGRAM ROUTE SLIP

☐ NEW APPLICATION

Jim W.
Jon D.
Proof
Cathy
Roger

Initial / Date

☐ NEW LICENSE

Jim W.
Jon D.
Proof
Carol
Cathy
Roger

Initial / Date

☐ HEALTH OFFICER CARD

Jim W.
Carol
Cathy

Initial / Date

☐ INSPECTIONS

Pat C.
Jon D.
Proof
Carol
Roger

Initial / Date

☐ INTERIM CLOSURES

Jim W.
Jon D.
Proof
Carol
Cathy
Roger

Initial / Date

☐ CLOSURES

Jim W.
Jon D.
Proof
Carol
Cathy
Roger

Initial / Date

☐ CHANGE IN LICENSE
FOR FEE STATUS

Jim W.
Jon D.
Proof
Cathy
Roger

Initial / Date

☐ COMPLAINTS

Pat C.
Jon D.
Proof
Roger
Carol (filing & DBase)

Initial / Date

☐ GENERAL CORRESPONDENCE

Pat C./Jim W.
Jon D.
Proof
Roger

Initial / Date

☒ MISCELLANEOUS

Grd Wtr
Proof
Pat C
Jon D

Initial / Date

Tom 11-1
PFC 11/1

Marked 11-1 - Tom

sw/14chel.m95

DEPARTMENT OF
ENVIRONMENTAL QUALITY

Waste Management Division
Solid Waste Program
406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE 2209 PHOENIX AVE.
LOCATION: HELENA, MONTANA

MAILING PO BOX 200901
ADDRESS: HELENA, MT 59620-0901

November 1, 1995

Ted Hill
City of Helena
316 North Park
Helena, Montana 59623

RE: CITY OF HELENA CLASS II LANDFILL - LICENSE NO. 90
REVIEW OF THE MAY 1995 GROUND WATER SAMPLING EVENT

Dear Mr. Hill:

The results from the May 1995 sampling event appear to be comparable with previous results at this site. The primary focus of the Department's review of the May 1995 ground water monitoring data was to evaluate the status of those compliance wells that have consistently exceeded the maximum contaminant level (MCL) of 5 $\mu\text{g/L}$ for tetrachloroethene. Those wells that were out of compliance in the past still remain significantly out of compliance according to the analytical results from the May 1995 ground water sampling event. These wells are: HL-90-1, MPC-1, and EPA-1. The most recent concentrations of tetrachloroethene detected in these wells were 14 $\mu\text{g/L}$, 9.9 $\mu\text{g/L}$, and 28 $\mu\text{g/L}$, respectively.

The landfill has been closed since 1994. The May 1995 analytical results are the first results which may indicate the effects of closure with regard to the tetrachloroethene concentrations in the ground water at the landfill. However, one must consider that this last monitoring event was conducted in the Spring and should have been coincident with high ground water and increased volumes of water in the aquifer. These slightly lower concentrations of tetrachloroethene could be the result of dilution in the aquifer due to increase precipitation and infiltration. Therefore, the Department finds these last analytical results (May 1995) inconclusive, with regard to monitoring any actual effects that closure has had on the ground water, to date.

It is the Department's concern that this passive remediation attempt at ground water compliance has not been effective, and will not be sufficiently effective to attain the 5 $\mu\text{g/L}$ ground water protection standard (GWPS)/MCL for tetrachloroethene in the future. Whether passive or active efforts are employed by the City to address impacts to the natural quality of the ground water in the area of the City of Helena's previous landfill site, there are still several

City of Helena Class II Landfill

Page 2

November 1, 1995

requirements that should be promptly addressed by the City. These pending requirements are:

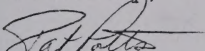
1. A public meeting in which the city is to discuss the results of the corrective measures assessment, prior to the selection of a remedy [ARM 16.14.708(6)(d) re-codified as ARM 17.50.710(6)(d)]; and
2. Further plume delineation [ARM 16.14.708(4)(a)(i) re-codified as ARM 17.50.710(4)(a)(i)] through the installation of at least one additional property boundary monitoring well [ARM 16.14.708(4)(a)(ii) re-codified as ARM 17.50.710(4)(a)(ii)].

The Department is extremely concerned that the contamination detected in the ground water at and adjacent to this inactive facility has not been adequately controlled. The aquifer beneath the landfill is the same aquifer which serves the valley with drinking water for many private wells.

Thank you for assisting me in expediently acquiring the additional analytical reports and field data sheets that I needed to evaluate this sampling event. It has been, and remains to be a general policy and regulation [ARM 16.14.706(15) re-codified as ARM 17.50.708(15)] of the Department to require the submittal of copies of all laboratory analytical data reports and field data sheets for each well, for each sampling event.

It is important that the City submit the proposed location for the additional plume delineation monitoring well(s) location(s) to the Department for approval, and notify the Department of the scheduled time and place for the required public meeting. Please be advised that the Department considers the remedy selected (i.e., no action, except for the normal closure requirements) may not meet the requirements of ARM 16.14.708(7)(b) re-codified as ARM 17.50.710(7)(b) as stated in our April 4, 1995 and June 30, 1995 letters.

Sincerely,



Pat Potts

Environmental Specialist

cc: Steve Downs, Hydrometrics, Inc., 2727 Airport Road, Helena, MT 59601
Kim Milburn, City of Helena, 316 North Park Avenue, Helena, MT 59623
Bill Verwolf, City of Helena Manager, 316 N. Park Ave.,
Helena, MT 59623

City of Helena Class II Landfill

Page 3

November 1, 1995

Vivian Drake, City-County Building, 316 North Park Ave., P.O. Box 1723,
Helena, MT 59624

Katherine Orr, Solid Waste Division attorney

path: sw\l&chel.m95

file: Lewis and Clark Co./City of Helena Class II (inactive)/grd wtr (corr)

**CLOSED
CITY OF HELENA LANDFILL
LICENSE NUMBER 90**

HYDROMETRICS

**LAB DATA AND FIELD FORMS FOR
MAY/JUNE 1995 SAMPLING**

OCTOBER 1995

**IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 3**

RECEIVED ?

**CLOSED
CITY OF HELENA LANDFILL
LICENSE NUMBER 90**

HYDROMETRICS

**DATA VALIDATION REPORT FOR SAMPLES
COLLECTED IN MAY AND JUNE 1995**

AUGUST 1995

**IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 3**

RECEIVED 8/18/1995

**CLOSED
CITY OF HELENA LANDFILL
LICENSE NUMBER 90**

HYDROMETRICS

**EVALUATION OF MAY 1995 GROUNDWATER
QUALITY DATA**

AUGUST 1995

**IS LOCATED IN THE GROUNDWATER
MONITORING REPORTS ARCHIVE,
BOX NUMBER 3**

RECEIVED 8/18/1995

HELENA LANDFILL

MAY 1995 SAMPLE EVENT

SAMPLE SITE AND PARAMETER LIST

SITE NAME

PARAMETERS

Monitor wells

Table 1

83-6

Table 1

EPA-1

Table 1

HL-90-1

Table 1

HL-90-2

Table 1

HL-90-3

Table 1

HL-90-3 (Duplicate)

Table 1

HL-94-1

Table 1

HL-94-2

Table 1

HL-94-3

Table 1

I-1

Table 1 VOC's

INF. GALLERY

Table 1 VOC's

MPC-1

Table 1

MPC-2

Table 1 VOC's

Residential Wells (to be sampled by L&C County WQD)

5

Custer & Benton

Table 1 VOC's

13

Oakwood Lane

Table 1 VOC's

31

Brady & Henderson

Table 1 VOC's

40

Oakwood

Table 1 VOC's

57

Dumbarton

Table 1 VOC's

75

Wing out Mitchell Ave

Table 1 VOC's

84

500 Cole

Table 1 VOC's

93

932 Aspen

Table 1 VOC's

96

933 Cedar

Table 1 VOC's

DI BLANK

Table 1

RINSATE BLANK

Table 1

RECEIVED

MAY 08 1995

Montana Department of Health
and Environmental Sciences
Waste Management Division

Table 1 + delinquent

Thubio? ok

45(?) for

83-7

EPA-2



RECEIVED

MAY 08 1995

Montana Department of Health
and Environmental Sciences
Waste Management Division

City of Helena

May 4, 1995

Ms. Pat Potts, DHES
Waste Management Division
P.O. Box 200901
Helena, MT 59620-0901

Dear Pat:

This letter is in response to your letter dated April 4, 1995, regarding the Helena Landfill Corrective Measures Assessment which was submitted to your department in February 1995. It is our hope that these responses will clarify many of the issues you raised in your letter. For your convenience, we have restated your comments and followed them with our responses. Also included are several replacement pages for your copies of the document.

General Comment #1

Possible avenues of risk and/or exposure that have not been considered in this alternative selection are:

Residences with impacted wells outside of the city limits that use their well water as a source of drinking water. Although no one contaminant exceeds a particular standard at this time, what might be the cumulative effect of these VOCs (even if they are not all attributable to the landfill) in their drinking water? Especially consider the portions of the population at higher risks, such as children and the elderly. Some of the residences that have been sampled that could be at risk are:

Robinson @ 328 Custer (#47),

C.A. Barbeau @ 308 Custer (#48),

W. Hill @ 112 Meadow (#42),

E. Hartze @ 220 Custer (#51),

No Name @ Custer and Green Meadow (#52),

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Director, Department of Health
and Environmental Services
State of Maryland



City of Helena

May 1, 1952

Mr. Lee P. Jones, Mayor
Helena, Montana
P.O. Box 1000
Helena, MT 59601-1001

Dear Sir:

Enclosed is a response to your letter dated April 11, 1952, regarding the Helena
Sanitary District. The response was submitted to your Department
in January 1952. It is our hope that these responses will clarify many of the
points mentioned in your letter. The responses were prepared by the
Sanitary District and followed them with our response. Also enclosed are several
responses to your letter of the same date.

Sincerely,
[Signature]

Enclosed is a copy of the letter to the Montana State Board of Health
dated April 11, 1952.

Enclosed with this letter are copies of the following documents which
were submitted to the Montana State Board of Health in January 1952:
1. A copy of the letter to the Montana State Board of Health dated
January 11, 1952, regarding the Helena Sanitary District.
2. A copy of the letter to the Montana State Board of Health dated
January 11, 1952, regarding the Helena Sanitary District.
3. A copy of the letter to the Montana State Board of Health dated
January 11, 1952, regarding the Helena Sanitary District.
4. A copy of the letter to the Montana State Board of Health dated
January 11, 1952, regarding the Helena Sanitary District.

Respectfully,
[Signature]

Enclosed is a copy of the letter to the Montana State Board of Health
dated April 11, 1952.

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dated April 11, 1952.

Enclosed is a copy of the letter to the Montana State Board of Health
dated April 11, 1952.

Enclosed is a copy of the letter to the Montana State Board of Health
dated April 11, 1952.

Bacon @ 108 Dunbar (#57),

Stolp @ 100 and 102 Dunbar (#59),

J. Bridges @ 76 Dunbar (#62), and

Elk River Concrete's well along Benton Avenue should have a warning sign.

Additional reinforcement discouraging the usage of irrigation wells and industrial supply wells for domestic usage/drinking within the city limits should also be considered.

Response to General Comment #1

A comprehensive risk assessment regarding cumulative affects of VOC's in groundwater is beyond the scope of the Corrective Measures Assessment (CMA). Risk based standards for each parameter of concern were determined as per ARM 16.14.708. The application of cumulative affects risk analysis is not consistent with the regulatory standards outlined in ARM.

The "Existing Corrective Measures" alternative was determined appropriate for the site based upon ARM 16.14.708 (e) which states that a "no action" alternative is appropriate if:

"the constituents are present only in waters which are currently or reasonably expected to be a source of drinking water, and are not hydraulically connected to waters to which the hazardous constituents are migrating or are likely to migrate in a concentration(s) that would exceed the groundwater protection standards"

If future groundwater monitoring indicates that constituents are migrating beyond their present conditions, then it would be appropriate to evaluate additional corrective measures.

Existing institutional controls prohibit the usage of waters in the area where VOC's exceed or are likely to exceed the groundwater protection standards. Although these waters are hydraulically connected to drinking water source areas, it is contended that because the landfill is closed and no additional sources will be added at the landfill, that worst case conditions already exist, and it is not reasonable to assume that water with constituents exceeding the groundwater protection standards will migrate into these areas. gas VOCs

A notification letter from the city to well owners within the VOC plume area (as per ARM 16.14.708 (4)(a)(iii)) provided the well owners with information on the groundwater quality in the area. This letter additionally discouraged well owners from drinking the water from their wells.

General Comment #2

In general, the screening process as a whole, addressed the issues required according to ARM 16.14.708. However, it is important to point-out that the initial screening criteria are to be reviewed according to ARM 16.14.708(6)(c) which is intended to address the following points for each potential remedy:

- (i) The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;
- (ii) The time required to begin and complete the remedy;
- (iii) The costs of remedy implementation; and
- (iv) The institutional requirements such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(ies).

Alternatives selected through the initial screening process are to be screened according to ARM 16.14.708(7)(c) which provides the following information for each alternative selected:

- (i) The long and short-term effectiveness and protectiveness of the potential remedy(ies), along with the degree of certainty that the remedy will prove successful . . . ;
- (ii) The effectiveness of the remedy in controlling the source to reduce further releases . . . ;
- (iii) The ease or difficulty of implementing a potential remedy(ies) . . . ;
- (iv) Practicable capability of the owner or operator, including a consideration of the technical and economic capability.
- (v) The degree to which the community concerns are addressed by a potential remedy(ies).

The final selection of an appropriate remedial alternative is to be evaluated according to the following factors ARM 16.14.708(7)(b):

- (i) Be protective of human health and the environment;
- (ii) Attain the ground water protection standards as specified pursuant to (5) of this rule (i.e., ARM 16.14.708);

(iii) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of Table 2 [ARM 16.14.706] constituents into the environment that may pose a threat to human health or the environment;

(iv) Comply with standards for management of wastes as specified in (8) of this rule.

(v) Be approved by the Department.

Although the specified regulatory format was not strictly followed, the pertinent technical information was presented in a clear, concise manner in this document. The final remedy(ies) selected, at a minimum, should be reviewed for the criteria required according to ARM 16.14.708(7)(b).

Response to General Comment 2

ARM 16.14.708 contains several criteria for evaluation of potential corrective measures. However, no specific regulatory format for applying these criteria is presented. As discussed in Section 4.1, the criteria presented in CMA are consistent with those specified in the ARM, however they have been grouped and categorized into a CERCLA type feasibility study format. This format was selected in lieu of strict regulatory guidance because of its proven technical and regulatory defensibility.

The criteria listed in ARM 16.14.708 (7)(b) were considered in the selection process in the reliability criteria presented in Section 6. Additionally, the criteria in ARM 16.14.708(c) and the modifying criteria in ARM 16.14.708 (d) were evaluated in the additional criteria groups presented in Section 6 (Ease of Implementation, Potential Impacts, Time-frame, and Cost).

Specific Comments

1. Table 2-1

Why aren't 83-7 and EPA-2 being sampled? Are they plugged and abandoned? Was April 1994 the first time EPA-1 was sampled and the ground water analyzed for VOCs?

Are there any monitoring wells or piezometers left west-northwest of EPA-1? If so, could they be sampled?

Response:

Monitoring wells 83-7 and EPA-2 are monitored only for static water level. Monitoring wells which are routinely sampled for water quality analysis are EPA-1, MPC-HL-1, HL-90-1, HL-90-2, HL-90-3, 83-6, 94-1, 94-2, and 94-3 as per the 1993 Helena Landfill Sampling and Analysis Plan which was approved by the MDHES. EPA-1 has been routinely sampled for VOC's since 1991.

-Sample

Monitoring wells 83-7 and EPA-4 are operational wells and could be sampled assuming water table conditions are appropriate (the wells contain water - well 83-7 was dry in January 1995).

2. Page 2-3

A. What concentration level(s) were used to calculate the volumetric equivalent of tetrachloroethene dissolved in a 365 acre, 50-foot deep plume?

Response:

The concentrations depicted by the contours on Figure 2-2 were utilized for the volume calculations, as referenced on Page 2-3. The contour method for determining average concentration and volume from contour map is a typical engineering practice.

B. Please list the specific monitoring wells that are completed in the lower part of the aquifer, and the total depth with the length of screened interval for each well. Approximately how thick is the aquifer beneath the landfill?

Response:

Several wells have been drilled through the uppermost aquifer into a confining layer. Some of these wells have been abandoned, and are no longer in service.

The wells completed in the lower part of the aquifer include :

Monitoring Well	Total Depth	Screened Interval	Confining Layer	Confining Layer
	Depth			
HL-2	28'	to 28'	clay	25'
HL-3	35'	to 29'	bedrock	28'
HL-4	42'	to 41'	clay	36'
82-1	40'	14-34'	bedrock?	34'
82-2	43'	23-43'	cemented sed's	30'
✓ HL-90-3	no water in the alluvium - limestone at 53'			
✓ 83-6	25'	19-23'	dolomite	21'

Most of these wells are peripheral to the landfill, and several wells drilled within the landfill have not been extended to a confining layer at depth of up to about 80'. An estimated 50 foot aquifer thickness is based on these peripheral wells and existing literature (USGS 1992 - "Hydrogeology of the Helena Valley-Fill Aquifer System, West Central Montana). While this estimate is quite subjective this figure was thought to be quite conservative as the average aquifer thickness in these peripheral wells is less than 10', and previous estimates of aquifer thickness in the area have been around 20 feet (Hydrometrics, 1991 and F and M consultants, 1992).

3. 2.2 GROUND WATER PROTECTION STANDARDS (GWPSs) pg. 2-7

- A. Methylene chloride (dichloromethane) does have a human health standard (HHS according to Montana WQB-7) which is 4.7 ug/L, and a maximum contaminant level (MCL), State and Federal, which is 5 ug/L.

Response:

Comment Noted. Page 2-7 and Table 2-2 (enclosed) have been revised to reflect this comment.

- B. What was the calculated GWPS for methylene chloride according to the risk-based equation presented on the bottom of page 2-7? How does it compare with the HHS, and the MCL?

Response:

The calculated GWPS for methylene chloride is presented on Table 2-2 (5ug/L). This is equivalent to the MCL and is an appropriate GWPS.

4. Page 2-9

Please note that the following constituents do have State HHSs, as well as State and Federal MCLs:

bromoform	HHS= 0.56 ug/L	MCL= 100 ug/L
dibromochloromethane (chlorodibromomethane)	HHS= 0.4 ug/L	MCL= 100 ug/L

Response:

We are in agreement that these constituents have established MCL's which would be appropriate for use as GWPS. However, GWPS were not listed for these constituents because these constituents are at higher concentrations upgradient and cross gradient from the landfill and are therefore not considered contaminants attributable to the landfill. *like where*

5. Page 2-9

If you can demonstrate that ground water contamination is coming from an upgradient source(s) other than the landfill through historical record documentation and/or field investigations, the Department would appreciate the timely submittal of this information, so that it can be reviewed, and so that other potentially responsible polluters or localized sources of contamination can be found and cleaned up.

Response:

Comment noted.

6. Page 2-10, TABLE 2-2

GWPSs have been established for the following compounds:

bromodichloromethane (chlorodibromomethane)	HHS= 0.41 ug/L	MCL= 100 ug/L
bromoform	HHS= 0.56 ug/L	MCL= 100 ug/L
dibromochloromethane (chlorodibromomethane)	HHS= 0.4 ug/L	MCL= 100 ug/L
methylene chloride (dichloromethane)	HHS= 4.7 ug/L	MCL= 5 ug/L

These standards need to be included in Table 2-2. Also, see comments in item #4 above (i.e., section 2.2 of the document), as some of this information has been repeated for the purpose of clarity in these comments.

Response:

A GWPS is included in Table 2-2 for methylene chloride, and is consistent with the MCL referenced. A GWPS for bromodichloromethane is also included on Table 2-2. This standard is equal to the background concentration as per ARM 14.16.708 (5)(c). GWPS were not listed for bromoform or dibromochloromethane as discussed in the response to comment 4.

7. Page 2-11

- A. Please explain how, and to what particular upgradient source(s) the following constituents are attributable: arsenic, chloroform, selenium, and bromodichloro-methane. Bis (2-ethylhexyl) phthalate (check spelling in document, please) is a common laboratory contaminant and has been detected in many of the Table 2 analyses for landfills in Montana.

Response:

These constituents are attributable to upgradient sources because they are detected at higher concentrations in upgradient wells than in downgradient wells. It is beyond the scope of the CMA and the city's financial obligation to trace these constituents to specific sources. A revised page 2-11 is enclosed and has been corrected for spelling.

- B. All but one [bis (2-ethylhexyl) phthalate] of the above constituents have an MCL, and therefore, a GWP/enforcement standard. Please explain how background concentrations are compared to GWPSs/MCLs at this site for the parameters/constituents mentioned above. It is not clear from the text what exactly is intended.

Response:

Groundwater protection standards have been developed for each of the parameters on Table 2-2. ARM 16.14.708(5) specifies the criteria for GWPS development, and the application of ARM 16.14.708 is demonstrated in the flowchart on Figure 2-3. For parameters which exhibit background concentrations above the MCL, the background concentrations were chosen as the appropriate GWPS.

- C. To what practical quantitation limit are you referring with regard to sulfides? There is a secondary drinking water standard for sulfate, but no enforcement standard, MCL, or PQL as far as I know; please explain. Also, note that the ARM citation should be corrected in this paragraph to read ARM 16.14.706.

Response:

The correction for the reference to ARM 16.14.706 is noted (revised page 2-11). The practical quantitation limit (PQL) for sulfide (according to ARM 16.14.706) is 4 mg/L which is several orders of magnitude higher than the level of sulfide detected in MPC-1. This demonstrates that the sulfide reported in the sample is suspect and at an extremely low level. No reference to MCL's or GWPS was made.

- D. Was there a reason for not including tetrachloroethene in the list of constituents entitled "potentially attributable to the landfill"? I realize the next section (i.e., 2.3 Contaminants of Concern) specifically addresses tetrachloroethene, but this chemical compound should appear on the list immediately preceding this section, as well.

Response:

Comment noted. Tetrachloroethene has been included on revised page 2-11.

8. DEGRADATION IN WATER Page 2-13

Please keep in mind that some of the commonly encountered degradation products of tetrachloroethene, when associated with landfill environments (anaerobic conditions, possible methanogenesis) are 1,2-dichloroethene (cis- and trans-), and/or vinyl chloride.

Response:

Comment noted.

9. Page 2-15

Please explain the risks, if any, that may be associated with the ingestion of tetrachloroethene which would be associated with home grown produce from backyard gardens irrigated with elevated levels of the VOCs found in the ground water at, and adjacent to the landfill. Also consider possible risks for ground water usage in swimming pools and lawn watering. In some instances, it has been

mentioned that well water is being used for drinking for various personal reasons (taste, economics, etc.).

Response:

Because the risk associated with the listed activities is intuitively less than for the drinking water exposure pathway, and it has been demonstrated that risks for utilizing these waters for drinking is extremely low, a risk assessment for these less intensive exposure pathways was considered inappropriate.

10. Page 2-16 EPA DRINKING WATER HEALTH ADVISORIES

Shouldn't the discussion concerning long-term health advisories be for protection against carcinogenic effects, not non-carcinogenic effects? If so, were the protective levels given in the text supposed to be in mg/L, or ug/L, as the MCL is only 5 ug/L for tetrachloroethene?

Response:

Carcinogenic effects are discussed beginning on the last paragraph of Page 2-16. The protective levels for non-carcinogenic effects are in mg/L as stated in the document.

11. Page 5-7, Figure 5-2 "Landfill Gas Extraction and Treatment"

This figure is inadequate for the determination of any landfill gas extraction plan. Maybe this figure was submitted incomplete by mistake. Please complete this figure to show plans for a landfill gas extraction system if you would like this technical methodology to be considered as a remedial alternative for the clean-up of the ground water contamination, and/or as possible source control.

Response:

The legend of this figure inadvertently described the shaded area as "general direction of groundwater flow" and should have read "area of landfill gas extraction". A revised Figure 5-2 is included. This area of gas extraction was preferred because this area of the landfill appears to be the main source for tetrachloroethene. Because this alternative is not a preferred remedy at this time, specific plans were not included in the CMA.

12. Page 5-10, Figure 5-4

Relatively speaking, where will the soil vapor extraction (SVE) wells and/or horizontal piping be installed relative to the air sparging plan outlined on this figure?

The Department is concerned that this approach to ground water remediation would likely result in explosive methane/air mixtures as described in Section 5.3.3. Please explain in greater detail, the likelihood of such an explosive situation, or the preventative measures that could be taken in advance to avoid this hazardous situation.

Response:

SVE extraction would occur directly above the sparging area to ensure that vapors are not allowed to migrate back into the landfill. This would likely prevent the likelihood of an explosive situation. It is a typical practice to extract up to five times the amount of air that is injected to ensure that migration of explosive vapors will not occur.

13. Page 5-13, Figure 5-6

Maximum tetrachloroethene concentrations (i.e., those exceeding the MCL) in the ground water appear to be localized adjacent to the northwest corner of the landfill property boundary [specifically, HL-90-1 (15 to 20 ug/L)]. Both the air sparging (and apparently the SVE, if displayed) and the ground water extraction plans only cover the northern boundary of the landfill, along the railroad tracks, westward to the Elk River Concrete facility. Do you think ground water flow control and/or soil vapor extraction (i.e., behind Elk River Concrete, or just west of the transfer station) would be helpful on the west-northwest landfill facility property boundary?

Response:

This determination would be made during the design phase of these alternatives if they are determined to be necessary.

GENERAL ECONOMIC COMMENTS

The Department strongly suggests that the City have several ground water models prepared to demonstrate the effects of these proposed remediation alternatives. This should include impacts on the contaminants and contaminant concentrations, compared to the length of time required for the ground water clean-up. Physical as well as chemical factors need to be more thoroughly evaluated to determine the applicability of the specific alternative(s).

An example of such a model demonstration for pump and treat would be based on the aquifer data available and the number of extraction wells required to sufficiently depress the water table to efficiently intercept the contaminants. Based on the nature of the contaminants, will the selected alternatives efficiently address all ground water contamination, or will phase-separated products (i.e., DNAPLs at the base of the aquifer) remain behind?

Response:

The modeling referred to in this comment would be appropriate if one of these alternatives is deemed necessary. However, this modeling is quite expensive and time-consuming and is not appropriate at this time.

Would SVE be adequate, even with air sparging to address the tetrachloroethene problem in the ground water, or will this technology only deal with the less dense VOCs? Is it possible from the data available to determine if the tetrachloroethene contamination is coming from a DNAPL pool at the base of the aquifer? Detectable concentrations of 1,1,1-trichloroethane appear to be centered around a cluster

of private wells located north of Custer Avenue. Does this help to explain possible degradation processes, or age date the contaminant plumes or chemical travel times in the aquifer in any way?

Response:

The spargeability (strippability) of a constituent is based upon the compound's Henry's Constant and not upon density. Compounds with a Henry's Constant of greater than 100 [atm - (m³water/ m³air)] are considered readily strippable. The Henry's Constant for tetrachloroethene is 1,100. As discussed on page 2-3 of the CMA, water quality data are not indicative of a significant DNAPL plume below the landfill. The significance of the cluster of 1,1,1-trichloroethane detects in wells along Custer Ave. has not been evaluated.

Assuming a landfill gas extraction system is required at this facility anyway due to the exceedance of lower explosive levels of landfill gases in the unsaturated zone, the design plan and schedule for implementation could be included in this CMS.

Response:

The city has not assumed that a landfill gas extraction system is required at the facility at this time, however, the City has upgraded its gas monitoring efforts.

INCOMPLETE ALTERNATIVE

It has come to the Department's attention that no re-vegetation has occurred, nor has the required erosional soil cover been installed over the low permeability/non-infiltration layer. This delay in final landfill closure requirements has created extended renewal fee payments for the City. Please be advised that if these passive, source control requirements are seriously being considered as the selected alternative for ground water remediation at this site, then these final closure requirements must be met in a timely manner, or a reasonable schedule of completion dates will need to be submitted to the Department along with any additional design requirements for prompt consideration.

Response:

As you note the required revegetation is not yet in place. The City has kept individual members of your Bureau informed of the plans and status of these efforts but perhaps a summary is appropriate here.

As the time for final cover neared, the City looked for sources for suitable clay material that could be economically obtained and transported to our site. Suitable material was made available to us from the Lewis and Clark County Landfill site and a contractor was hired to haul and place it. The site was surveyed to determine how much material was required and where. After the clay was

delivered to the site the contractor distributed it. This process also compacted the clay layer very well over the large fairly level areas. The site was then resurveyed. Several areas were found with insufficient depth and others that had an excess. The City decided to haul in more clay to fill the low spots rather than try to redistribute what had already been compacted. Neither clay nor a hauling contractor were available before winter (1994-1995). The material was hauled to the site as soon as possible in the spring of 1995. The city expects to have all material properly placed, compacted as required, and seeded before winter of 1995.

Another related item that is not yet complete is the methane monitoring wells. The Bureau has directed the City to install three methane monitoring probes in the toe of the slope along the north edge of closed landfill. This slope is so steep that platforms must be constructed for the drill rig to operate from. This adds considerable time and cost. The City has proposed that these wells be located instead on city property across the tracks to the north. This would protect human health and property at least as well as the Bureau's directed action. If the Bureau would agree to this, the methane monitoring wells could be in place in a few days at much less cost to the public.

REQUIRED PUBLIC MEETING

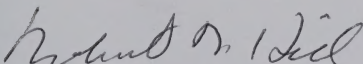
The required public meeting [ARM 16.14.708 (6) (d)] will also be necessary to finalize the actual alternative selection. It is the responsibility of the owner/operator to schedule this meeting and provide sufficient public notice. The Department suggests that we have a meeting well in advance of the public meeting to discuss the above issues, and hopefully agree on the most effective and appropriate approach to ground water remediation at this site for all involved parties.

Response:

The city agrees that it would be appropriate to discuss these issues with the department, and would like to schedule a meeting in the near future.

We look forward to discussing these issues with you in person. Please call if you have any questions.

Sincerely,



Robert T. Hill
Environmental Engineer

constituent identified as potentially attributable to the City of Helena Landfill or migrating through the landfill is established as one of the following according to the flow chart presented in Figure 2-3:

- the maximum contaminant level (MCL) for that constituent;
- the background concentration for the constituent;
- established health-based standard for the constituent (Circular WQB-7); or
- concentration established by risk analysis performed in accordance with ARM 16.14.708 (5) (d).

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TABLE 2-2
Development of Groundwater Protection Standards

Parameter	Max. Detect. Upgradient (mg/L)	Max. Detect. Inside RCB (mg/L)	Max. Detect. Downgradient (mg/L)	Potentially Attributed to Helena Landfill?	Develop GW Protection Standard?	Contaminant of Concern?	GW Protection Standard (mg/L)	GW Protection Standard Basis
Arsenic	0.0070	nd	nd	no	✓*	no	0.05	(1)
Barium	nd	0.1000	0.1000	✓	✓	no	2.0	(1)
Iron	0.0900	0.0300	nd	✓	✓	no	300	(4)
Selenium	0.0270	nd	nd	no	✓*	no	0.05	(1)
Zinc	0.0300	0.1500	0.0700	✓	✓	no	5.0	(4)
1,1,1-Trichloroethane	nd	0.0041	0.0017	✓	✓	no	0.2	(1)
1,1-Dichloroethane	nd	0.0073	0.0010	✓	✓	no	0.007	(1)
1,2-Dichloropropane	nd	0.0028	nd	✓	✓	no	0.005	(1)
Bromodichloromethane	0.0170	nd	0.0015	no	✓*	no	0.017	(2)
Bromoform	0.0150	nd	nd	no	-	-	-	-
Carbon Disulfide	nd	nd	0.0021	no	-	-	-	-
Chloroform	0.0620	0.0061	0.0430	no	✓*	no	0.062	(2)
Cis-1,2-Dichloroethene	nd	0.0018	0.0024	✓	✓	no	0.07	(1)
Dibromochloromethane	0.0290	nd	nd	no	-	-	-	-
Dichlorodifluoromethane	nd	0.0044	0.0030	✓	✓	no	6.9	(4)
Methylene Chloride	nd	0.0021	0.0012	✓	✓	no	0.005	(1)
Tetrachloroethene	0.0052	0.0410	0.0051	✓	✓	✓	0.005	(1)
Toluene	nd	nd	0.0062	✓	✓	no	1.0	(1)
Trichloroethene	nd	0.0031	nd	✓	✓	no	0.005	(1)
Trichlorofluoromethane	nd	0.0030	0.0015	✓	✓	no	10.0	(4)
Trans-1,4-Dichloro-2-Butene	nd	nd	0.0020	no	-	-	-	-
Bis (2-ethylhexyl) Phthalate	0.0100	nd	nd	no	✓*	no	0.01	(3)
Cyanide (total)	nd	0.0400	0.0047	✓	✓	no	0.2	(4)
Sulfide	nd	0.0400	nd	✓	no**	-	-	-

Concentrations in **bold** equal or exceed the Groundwater Protection Standard

- (1) Maximum Contaminant Level (MCL) as adopted by the State of Montana
- (2) Based on highest value measured in background wells
- (3) Background concentration exceeds MCL or health-based standard
- (4) Health-based standard (from Circular WQB-7)
- (5) Based on risk analysis performed in accordance with ARM 16.14.708 (5) (d)

RCB Relative Compliance Boundary

nd Not Detected

- Parameter has been eliminated - no Groundwater Protection Standard is established

✓* Groundwater Protection Standard necessary despite upgradient source

no** No existing guidance or standards for protection of human health

Shading indicates a Contaminant of Concern

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 Waste Management Division

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protection standards have been established for the following constituents to verify that detected concentrations remain attributable to up-gradient sources:

- Arsenic
- Bromodichloromethane
- Chloroform
- Bis (2-ethylhexyl) Phthalate
- Selenium

Sulfide was detected at MPC-1, but at concentrations considerably lower than the practical quantitation limit listed in ARM 16.14.706. No guidance or standards have been established for protection of human health for sulfide, and therefore, no groundwater protection standards has been established:

The remaining constituents were detected during sampling and are potentially attributable to the landfill. Therefore, groundwater protection standards were established for the following (Table 2-2):

- Barium
- Cyanide
- Dichlorodifluoromethane
- 1,1-Dichloroethane
- Cis-1,2-Dichloroethene
- 1,2-Dichloropropane
- Iron
- Methylene Chloride
- Toluene
- 1,1,1-Trichloroethane
- Trichloroethene
- Trichlorofluoromethane
- Zinc
- Tetrachloroethene

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Montana Department of Health
and Environmental Sciences
Waste Management Division

2.3 CONTAMINANTS OF CONCERN

Previous sections have detailed the detection of several organic and inorganic constituents in monitoring wells in and near the Helena Landfill. In order for a chemical constituent to be considered a Contaminant of Concern for corrective measures consideration, it must meet the following criteria:

protection standards have been established for the following constituents to verify that detection concentrations remain attributable to up-gradient sources:

- Arsenic
- Chloroform
- Bis (2-ethylhexyl) Phthalate
- Bromodichloromethane
- Selenium

Sulfide was detected at MPC-1, but at concentrations considerably lower than the greatest quantitation limit listed in ARAI (0.14-700). No guidance or standards have been established for protection of human health for sulfide, and therefore, no groundwater protection standards has been established.

The remaining constituents were detected during sampling and are potentially attributable to the landfill. Therefore, groundwater protection standards were established for the following (Table 2-3):

- Barium
- Dichlorodifluoromethane
- Cis-1,2-Dichloroethane
- Iron
- Toluene
- Trichloroethene
- Zinc
- Cyanide
- 1,1-Dichloroethane
- 1,2-Dichloropropane
- Methylene Chloride
- 1,1,1-Trichloroethane
- Trichlorofluoromethane
- Tetrachloroethene

2.3. CONTAMINANTS OF CONCERN

Previous sections have detailed the detection of several organic and inorganic constituents in monitoring wells in and near the Helen Landfill. In order for a constituent to be a candidate for a Contaminant of Concern for protective measures consideration, it must meet the following criteria:

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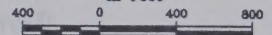
Legend



Area of Landfill Gas Extraction

Scale

In Feet



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Proj. No: CHHL03
Dwg. No: 52895014
Drawn By: 0083
Last Update: 5/3/95
Ref. Dwg: 52895009
Rev. Date:

Hydrometrics, Inc.

MAY 09 1995

Montana Department of Health
and Environmental Sciences
Waste Management Division

Figure 5-2

Alternative 2:

Landfill Gas Extraction and Treatment

City of Helena Landfill
Helena, Montana



Hydrometries, Inc.
 MAY 09 1982
 Figure 8-2
 Alternative 2:
 Landfill Gas Extraction and Treatment
 City of Harrisburg
 Harrisburg, Maryland
 Project No. 100000
 Date: 05/09/82
 Drawn by: JWS
 and updated by: JWS
 Date: 05/09/82
 Project Manager: JWS
 Date: 05/09/82
 Harrisburg Department of Health
 and Environmental Services
 Waste Management Division

constituent identified as potentially attributable to the City of Helena Landfill or migrating through the landfill is established as one of the following according to the flow chart presented in Figure 2-3:

- the maximum contaminant level (MCL) for that constituent;
- the background concentration for the constituent;
- established health-based standard for the constituent (Circular WQB-7); or
- concentration established by risk analysis performed in accordance with ARM 16.14.708 (5) (d).

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contaminant identified as potentially attributable to the City of Hoboken Landfill or
 originating through the landfill is established as one of the following according to the flow
 chart presented in Figure 2-15:

- the maximum contaminant level (MCL) for that contaminant;
- the background concentration for the contaminant;
- established health-based standard for the contaminant (Cincinnati WQS-7); or
- concentration established by risk analysis performed in accordance with ARM.

10-14-08 (2) (4)

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TABLE 2-2
Development of Groundwater Protection Standards

Parameter	Max. Detect. Upgradient (mg/L)	Max. Detect. Inside RCB (mg/L)	Max. Detect. Downgradient (mg/L)	Potentially Attributed to Helena Landfill?	Develop GW Protection Standard?	Contaminant of Concern?	GW Protection Standard (mg/L)	GW Protection Standard Basis
Arsenic	0.0070	nd	nd	no	✓*	no	0.05	(1)
Barium	nd	0.1000	0.1000	✓	✓	no	2.0	(1)
Iron	0.0900	0.0300	nd	✓	✓	no	300	(4)
Selenium	0.0270	nd	nd	no	✓*	no	0.05	(1)
Zinc	0.0300	0.1500	0.0700	✓	✓	no	5.0	(4)
1,1,1-Trichloroethane	nd	0.0041	0.0017	✓	✓	no	0.2	(1)
1,1-Dichloroethane	nd	0.0073	0.0010	✓	✓	no	0.007	(1)
1,2-Dichloropropane	nd	0.0028	nd	✓	✓	no	0.005	(1)
Bromodichloromethane	0.0170	nd	0.0015	no	✓*	no	0.017	(2)
Bromoform	0.0150	nd	nd	no	-	-	-	-
Carbon Disulfide	nd	nd	0.0021	no	-	-	-	-
Chloroform	0.0620	0.0061	0.0430	no	✓*	no	0.062	(2)
Cis-1,2-Dichloroethene	nd	0.0018	0.0024	✓	✓	no	0.07	(1)
Dibromochloromethane	0.0290	nd	nd	no	-	-	-	-
Dichlorodifluoromethane	nd	0.0044	0.0030	✓	✓	no	6.9	(4)
Methylene Chloride	nd	0.0021	0.0012	✓	✓	no	0.005	(1)
Tetrachloroethene	0.0052	0.0410	0.0051	✓	✓	✓	0.005	(1)
Toluene	nd	nd	0.0062	✓	✓	no	1.0	(1)
Trichloroethene	nd	0.0031	nd	✓	✓	no	0.005	(1)
Trichlorofluoromethane	nd	0.0030	0.0015	✓	✓	no	10.0	(4)
Trans-1,4-Dichloro-2-Butene	nd	nd	0.0020	no	-	-	-	-
Bis (2-ethylhexyl) Phthalate	0.0100	nd	nd	no	✓*	no	0.01	(3)
Cyanide (total)	nd	0.0400	0.0047	✓	✓	no	0.2	(4)
Sulfide	nd	0.0400	nd	✓	no**	-	-	-

Concentrations in **bold** equal or exceed the Groundwater Protection Standard

- (1) Maximum Contaminant Level (MCL) as adopted by the State of Montana
- (2) Based on highest value measured in background wells
- (3) Background concentration exceeds MCL or health-based standard
- (4) Health-based standard (from Circular WQB-7)
- (5) Based on risk analysis performed in accordance with ARM 16.14.708 (5) (d)

RCB Relative Compliance Boundary

nd Not Detected

- Parameter has been eliminated - no Groundwater Protection Standard is established

✓* Groundwater Protection Standard necessary despite upgradient source

no** No existing guidance or standards for protection of human health

Shading indicates a Contaminant of Concern

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protection standards have been established for the following constituents to verify that detected concentrations remain attributable to up-gradient sources:

- Arsenic
- Chloroform
- Selenium
- Bromodichloromethane
- Bis (2-ethylhexyl) Phthalate

Sulfide was detected at MPC-1, but at concentrations considerably lower than the practical quantitation limit listed in ARM 16.14.706. No guidance or standards have been established for protection of human health for sulfide, and therefore, no groundwater protection standards has been established:

The remaining constituents were detected during sampling and are potentially attributable to the landfill. Therefore, groundwater protection standards were established for the following (Table 2-2):

- Barium
- Dichlorodifluoromethane
- Cis-1,2-Dichloroethene
- Iron
- Toluene
- Trichloroethene
- Zinc
- Cyanide
- 1,1-Dichloroethane
- 1,2-Dichloropropane
- Methylene Chloride
- 1,1,1-Trichloroethane
- Trichlorofluoromethane
- Tetrachloroethene

2.3 CONTAMINANTS OF CONCERN

Previous sections have detailed the detection of several organic and inorganic constituents in monitoring wells in and near the Helena Landfill. In order for a chemical constituent to be considered a Contaminant of Concern for corrective measures consideration, it must meet the following criteria:

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Revised 5-4-95

protection standards have been established for the following constituents in water but detected concentrations remain attributable to up-gradient sources:

- Arsenic
- Chloroform
- Selenium
- Bromochloromethane
- Bis (2-ethylhexyl) Phthalate

Sulfide was detected at MW-1, but at concentrations considerably lower than the protection standard limit listed in ARM 16-1-706. No guidance or standards have been established for protection of human health for sulfide and therefore, no groundwater protection standards has been established.

The remaining constituents were detected during sampling and are potentially attributable to the landfill. Therefore groundwater protection standards were established for the following (Table 2-2):

- Barium
- Bromochloromethane
- Eth-1,2-Dichloroethane
- Iron
- Toluene
- Trichloroethane
- Xylenes
- Cyanide
- 1,1-Dichloroethane
- 1,2-Dichloropropane
- Methylene Chloride
- 1,1,1-Trichloroethane
- Trichlorofluoromethane
- Trichloroethane

2.2 CONTAMINANTS OF CONCERN

Previous sections have detailed the detection of several organic and inorganic constituents in monitoring wells in and near the Helms Landfill. In order for a constituent to be considered a Contaminant of Concern for corrective measures consideration must meet the following criteria:

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Western Department of Health
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Waste Management Division



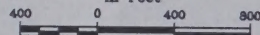
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Area of Landfill Gas Extraction

Scale

In Feet



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and Environmental Sciences
Waste Management Division

Hydrometrics, Inc.

Figure 5-2
Alternative 2:
Landfill Gas Extraction and Treatment
City of Helena Landfill
Helena, Montana

